Admiral John Richardson, CNO
All-Hands Dahlgren
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Admiral Richardson: Good morning. I'll get right to it.

First of all, thank you all for coming out this morning. I want to outline just a couple of things. First, I've done quite a few of these by now. I'm really happy to be here at Dahlgren to talk to all of you.

I'm particularly down here because I'm interested in finding out where our Navy is on the cutting edge of some really critical technologies. We just don't have enough time to look at everything that you're doing down here, but we are going to take a good look at directed energy and how fast can we move forward in the area of directed energy. So lasers and the rail guns. Also we'll look at the USS Secure, talk about cyber security, particularly as it pertains to combat systems. Then along the way we'll learn about other things, as much as we can. Then we'll probably have to program another visit to come on down here and see the rest.

But as I work around the Navy, there's a number of different efforts underway. The work that's going on here, and we're doubling down on a lot of the things that you're doing, so I'm very interested in finding out how fast can we move; how can we compete in time in the technology that you're developing uniquely here, or you have a lead for it here; and then what obstacles are in our way for going faster; and what can I do to help remove or minimize those obstacles. So I'm very interested in finding out kind of the theoretical limit of performance from a technical standpoint and then also from a programmatic standpoint so that I understand exactly kind of the limiting factors that are preventing us from getting some of these technologies into the fleet.

So we really just had to come down here and talk to the experts to get a sense of that. By the time it gets to the CNO Conference Room it is really hard to get your mind around it, get your hands in it. So that's why we took a trip down here today.

It's a beautiful drive coming on down. I know many of you have made it several times back and forth, but it's a beautiful kind of foggy morning, and it was great coming on down here.

As always, as much excitement or as much anticipation as I have about seeing what you do, far and away the best part of the visit is actually spending time with all of you. That would be my major message this morning as we start a conversation. I know that all of you, if you think about the talent in this room right now that we have to the left and to the right of us. Some of you have been in this business doing government work for a while, some of you are just getting started. But all of you have a lot of choices. I talk a lot about competition. I'm very interested in competition. I'm very interested in winning competition, and I know that there's tremendous competition for talent that you have. And it's not only the talent that you have, but also sort of the type of people that you are. You bring a full package when you come.

So I wanted to tell you first and foremost how much I respect that, how much I respect the fact that you have made a choice to join the Navy team, and that with all of those options that you have, you chose to raise your right hand and take an oath to support and defend the constitution and be part of something bigger than yourself. And I'm committed as the leader of the Navy, to make sure that what I believe is the value system that attracted you to make this choice, that our behaviors are consistent with those values at every step of the way. And I ask you to keep me honest there. I don't pretend to have 100 percent insight or visibility into everything that goes on, so I'd ask you to keep me honest. If you see something that's inconsistent, where our behaviors are inconsistent with our values, I think that that puts us at a competitive disadvantage for the type of talent that we need, and I need to know about that very quickly. So let me know if we have sort of a [inaudible] mismatch in that regard because I think it is our values, and this idea of contributing to something bigger, something noble, that is our competitive edge. That's why we can continue to meet recruiting goals. That's why we continue to meet retention goals in most areas. I can't compete in salaries. I just can't do it. So what brings you here I think is this sense of mission, sense of doing something important, and the nobility of that cause. So let's make sure we preserve those attributes. It helps us maintain our cutting edge. Okay? So help me out there.

We can talk about that this morning, if you want.

The other thing I was wondering, it's better to communicate through questions and answers. In fact, I do a lot of these

All-Hands calls in fleet concentration areas. So this audience is largely composed of our Navy civilians which is terrific and I want to talk about that some more. But a lot of times it's almost all sailors, all the young sailors, coming up off the waterfront. And I don't know if you've studied this, but I will just tell you my experimental evidence is that the United States sailor can fall asleep in 90 seconds. On average. 90 seconds. So I've learned to keep my monologues short and just go right to questions. And usually through the Q&A I can get to say most of what I need to say, and we do it in a participative, back and forth way. Okay?

So a highly educated crowd in here, sharp minds, inquisitive, everything. I give you 270 seconds before you fall asleep. I know I came to the edge of that. So let me just close my opening statement by again saying thank you, and reiterating how much I respect what you do, the great work that you do that is going to keep us competitive going forward.

With that, I'm happy to take any questions that you may have.

Question: I had a question about the future role of aircraft [inaudible].

Admiral Richardson: The question is how do I see the role of the aircraft carrier in the future Navy. Why do you ask that question?

Question: Because [inaudible] long range. Is it really true? [Inaudible]?

Admiral Richardson: Usually there's a veiled undercurrent to this question like is the carrier survivable? Is it quickly becoming a wasting asset?

As far as I see into the future, I see that the aircraft carrier is going to be a central part of operating and warfighting at and from the sea. In fact we did a lot of work thinking about what the Navy should look like, what capabilities should it embody, how big should it be, how do we keep it ready to do its job. And in all those studies which came from a bunch of different places. It wasn't just us. Took a lot of different projections on the question. All of those studies validated the need for aircraft carriers. In fact what they really did is maybe we need a couple of different types of aircraft carriers.

So when you start to think about the aircraft carrier as I think about it, you have to think about it in the context of the entire fleet design. That's changing a lot, some of that brought about by the technologies that are developed in places just like here. So when you start to think about more and more capable unmanned, more and more capable weapon systems that can be fielded on maybe smaller and smaller aircraft, that could give rise to a different type of a fleet design, a different role for naval aviation which might generate a different design for the launch and recovery platform. But the aircraft carrier going forward, as far out as we can see right now is still very very central to that fleet design and fleet architecture.

Question: The [inaudible] main line [inaudible]. So [inaudible] I see it as one of the [inaudible]. We have an ability to give back the knowledge that we have [inaudible] across every community, every [inaudible] that information.

My question is [inaudible].

Admiral Richardson: Terrific question. I don't know if you heard it in the back, but basically the Chief is saying hey, I've read the High Velocity Edge by Dr. Spear, and in your design you talk about fast learning, high velocity learning. So how do I see that?

As you may know, the Green Line of Effort is one of four lines of effort in the design for maintaining maritime superiority and it talks about fast learning. I'll just back up, if you'll give me a few minutes, to talk about how I think about fast learning, and then we'll dive down and pursue it whichever way you want to take it.

So the first question we have to ask ourselves when it comes to learning is do we have the knowledge in-house that we're trying to -- do we know what we're after? If we have the answer, if we have the knowledge, then what we're talking about is teaching. And we do a lot of teaching in the Navy, right? We bring 40,000 sailors a year into the Navy and teach them how to be sailors. Teach them how to be technical experts. We have a lot of schools in our Navy. So this part of fast learning, high velocity learning, is how to be the best teachers that we can be. So there's a whole bunch of schools in the Navy, and many of you have been students in those schools. And in the last decade or so if you follow the literature, we have learned an amazing amount about how people learn. How our brains work. With technological advantage you can almost tune your learning

experience to exactly the optimum way that each individual learns. So we all earn in a little bit different ways, right? Some of us like to watch videos, some of us like to read, some of us like to see pictures, some of us like to do. And you can tailor an educational experience to the individual to a degree, and that can really enhance learning.

One of the things that has been key to advancing these teaching technologies is the role of feedback from the students. So if you think about the classic education model, the brick and mortar school that so many of us went through, we all sat in classrooms and we went through a curriculum and it was kind of paced by the teacher, and everybody sort of moved along together. And how many of you sat in those classrooms and said well, I already get this, I'm kind of just, I get it, I'm ready for the next thing. How many have had that experience? Right. So a smart group here. So you're saying next, next, next, I got it, I got it, move, right?

Well, it would be great, don't you think, if you could feed that back end and the teacher, maybe with some assistance says okay, if you've got it we'll move on. We'll move faster. Right?

This is where I was. I still don't get it and you're moving on to the next chapter. Right? How many people have been in that class? That's the boat I live in, right? Slow down, I don't get it yet. Nope, calendar, move on, it's time to go, right?

So there's this whole role of feedback from student to instructor that has really optimized the learning experience. So the feedback allows the teacher to say hey, Richardson learns with pictures, right? So I've got to find a more visual way to communicate to this person, to Richardson, because that's how he learns best. And I know that because of feedback.

So that's just teaching. That's teaching stuff. That's when we know the body of knowledge, we just have to transfer that body of knowledge into a student or group of students, and we want to do that in as advanced and effective a way as possible, and there's been a lot of work done in that area and we need to bring that on board in the Navy. So we're working with some teaching institutions that have done terrific research in this area.

So that's one thing.

If we don't know the answer, we're now not in a teaching role, this is more your venue, right? We don't know what the answer is, to be honest. We're researching. Now you kind of get into a much more classic thing.

Now I pause in this document, in the Green Line of Effort, because oftentimes we know it, but we don't know that we know it. Right? If you understand that. So the research has been done, and you're an academic crowd, so you know one of the first things you're going to do when you embark on a new project, you're going to do a literature search, right? You're going to find out what's come before me that can, maybe this problem's already solved but I just don't know about it.

In the academic world we do that pretty well, and oftentimes in peer review if you didn't catch it, one of your peers will catch it and say it's a genius idea, too bad somebody thought of it 50 years ago, right?

In a lot of other contexts we're not so good about that. Sometimes when we think we don't know it it's just that we're not aware that somebody else has done it. So I say let's pause and let's make sure we examine, we do a search. We make sure that we don't relearn something from history. Relearn a lesson, relearn somebody else's report. So let's not repeat work that's been done before. Okay?

But after we do that kind of a search, and that's not easy because it's not super well categorized in many areas of our business. But after we do our best effort and we still don't have the knowledge, now we are truly learning forward. We are moving into new horizons, uncharted water, if you will. So how do you do that?

Well, you make a guess, right? You make a best guess, you put together a program to confirm that guess.

Now there's a couple of things about that that I think are characteristic of this learning business. One is, I'm going to guess that if I take a particular action, if I do something. Let's just use a safety context because it's easy to talk about. We want to drive accidents to zero. That's the theoretical limit. Right now we have 100 accidents per month, just for discussion purposes. So I put together a program. I say hey, if we do this class, motorcycle safety, let's say. If we go through this motorcycle safety course and we do this class, first of all, that's going to be an investment. We're going to

take people's time and all that sort of thing. But the return on that investment will be I'll reduce motorcycle accidents by 50 percent. Okay? So that's a pretty decent guess. It's kind of got a measure out there. I think that's an important part of it. You've got to guess what your expected performance should be when I take this particular effort. Very much like the scientific method. Anybody starting to recognize that? Hypothesis, experiment, then you get your results, then you get synthesis, right? So that's kind of the engine. It's all about making a guess.

This is where we're truly learning going forward. Make a best guess, put together a program, execute, and how'd you do against your predictions? Right? And that includes, let's say I reduce it by 75 percent. Wow, I got a lot better results than I predicted. Well, let's figure out why that happened too, right?

Then once you resolve, you examine that difference, what are you going to do? Well, you're going to adjust and you're going to be smarter going forward and be even better. That's how you kind of drive this thing to get the results you want.

How do you bring that into an operational context? Well, it's going to be through leader development I think. So as we think about training our leaders, particularly our deck plate leaders, our front-line supervisors. You know, teaching them to sort of create the environment where everybody in the organization can say I think we can do this better. If we just did this I could improve performance by 20 percent. Okay. Let's give this a try. If you can ask the questions that lead to that type of behaviors from everybody in the command, then that's sort of fast learning, right? So we start to accumulate this.

Since you've read the book, there's other behaviors that I think across the Navy we'd want to embrace. One is, we learned a great lesson here at Dalhgren. What does that mean for the rest of the Navy, particularly maybe the warfare centers, right? How do I share that lesson across a broader Navy? And then back to the leader development. How do I develop people that will kind of instill this learning wherever they're taking charge going forward? So there's a piece of this that has to do with leader development, and we're working with Newport on that. There's a piece of this that has to do with education, and we're working with the training commands on that. So that's kind of how I see the whole thing going forward.

That's a long answer to your question. I just want to make sure I got to it.

Question: You did.

Admiral Richardson: Perfect.

Question: [Inaudible]?

Admiral Richardson: First if all, that's fine here. [Laughter]. That's exactly the question I have for the next [inaudible]. That's my question for you.

I'll tell you what I think it is, sort of the idea I'm coming down to validate and learn about is that one, I just want to understand sort of the technology. Particularly lasers and electromagnetic rail gun. What are the scientific and engineering limits here? So there's that.

With respect to integration, though, I would imagine that the power systems that have to fire these weapons up, you know, pulse power, a lot of power in a very short period of time. The ability to do that on a repeatable basis. If you think about the stored energy requirements to be able to do that, and recharge, whatever it is, a capacitor bank or something, I think that generating that type of power is different than a lot of our propulsion systems are designed to do. So that seems to me to be a big challenge in terms of integration.

Then there is, I would imagine that these systems can generate a fair amount of heat. So how do you keep them cool? This is getting back to the engineering issue, but it's going to be a ship system that keeps it cool. What are the challenges associated with that?

So if you think about it, to me, it's understanding the power requirements and cooling requirements, and then just the sort of science and engineering challenges. That's what I hope to gain from my visit here.

How do you see it?

Question: [Inaudible].

Admiral Richardson: I would say that if I compare overall say volume required to do one of these systems, I would be interested to compare it with sort of a classic gun, right? The

rail gun is still going to have a projectile, but if you're talking about a laser or something like that, there's no projectile. There's no need for a magazine. So overall we might save space and weight, but it's not, coming to your point, I think what you're saying is I can't just sort of add this on to a current platform without accommodating for space and weight, right? You're right. So we'll design it in to future platforms, and I think we'll come out net ahead. Solve the magazine problem at least in this area, right? Which would be terrific. Then we'll have to be clever about how we back set it, if indeed we can.

Question: My question is about infrastructure. So [inaudible].

Admiral Richardson: What is CSCS? I'm sorry?

Question: [Inaudible] Combat --

Admiral Richardson: Okay, gotcha.

Question: [Inaudible]. So we have training sites in Japan, San Diego, [inaudible] area, Great Lakes, Rota, and advocating for facilities in [inaudible] 100 years old.

Admiral Richardson: 100 years old.

Question: Yes, sir.

Admiral Richardson: I think Dahlgren himself was -- [Laughter].

Question: [Inaudible], things like that. Do you see [inaudible]investment down the road helping [inaudible]?

Admiral Richardson: Yeah, so let me put that in a bit broader context. The facilities question and the installation question is a challenging one for us. So under what I think we would all agree is kind of a resource constrained environment that we've been in for a while now. We're on our 9th year of a Continuing Resolution. Nine years in a row we've had a CR. And so if you think about the behaviors that emerge from that type of a situation, we adapt. We learn. I'm not going to put anything at risk in that first quarter that's important because I never get the money and the authority to start anything there. Right? So if you think about, again, competing, we're in a pretty sporty competition right now, and if we were a business you would have to say that we're kind of competing only using three or four fiscal quarters.

So how about if I take one of your wheels off your car and see how well you do in the Daytona 500, right? It's hard to compete.

So that's one behavioral manifestation of this resource constrained environment.

Another one is that as we've had to prioritize where every dollar goes, it would be absolutely fair to say that installation has been the net bill payer for a lot of that as we build ships and combat systems. We brought all these programs to the fleet, many of which started here. Installations have been the thing that we have not resourced as much

So my great hope is that we can correct that. And we aren't the only people that own this problem. Installations and infrastructure and those sorts of things certainly across the Navy, but in many many areas across the country.

I was at Naval Reactors before I came here, which is a dual Department of the Navy/Department of Energy facility. Department of Energy is going through the same thing, particularly in the nuclear business. Many of those facilities were built at the dawn of the nuclear age and haven't been changed since, right?

So I go back also to talent. You're all, as I said, wonderful for your patriotism, your loyalty, your commitment. But I can't use that against you, if you will, and ask you to work in a facility that's just 100 years old. It makes it harder for me to compete for that real cutting edge, high end talent when you go to some brand new building that a private company has and we've got something that needs to be upgraded.

So there are a lot of dimensions to this question that you have that are very important. As I said, my great hope is that we can tilt this back and get it corrected and start updating it. I'm glad you brought it up.

Question: I [inaudible] all the time, and given some of the recent news talking about the green fleet, social programs, the nominee for the Secretary of Defense in readiness [inaudible], operational energy, those types of things. It's a readiness issue. Vulnerability for fueling has got to be [inaudible] discussion of operational energy, social dynamics. Is the green fleet a social program? Or what is that meant to mean?

Admiral Richardson: I've never heard the green fleet called a social program before, so I'm not sure I understand what that means. But I think the Secretary of the Navy has been pretty clear about the fact that to the degree that we can become independent of fossil fuels, particularly those that we get from other nations, then that is a net enhancement of our security. And how we do that, we can talk about all sorts of ways. I think that's gone well beyond social and enhances our security to the degree that we're sort of energy independent, right? We're not dependent on overseas sources for that fuel.

That seems to me to be beyond social.

I just sort of feel a general responsibility also when it comes to the green part of this to be socially responsible, environmentally responsible. The way we do this going forward, I think, the way we leaders think about it is very important to setting the right tone. We just are a lot smarter now in terms of how we interface with the environment than we were before. Technology has come a great distance here. So I feel a responsibility to be more sustainable in this regard. Right?

I'm ready to have those discussions. I don't know if it's really a social thing, but it's certainly an environmental responsibility. To the degree that we can do that we need to be open minded to deal with that. I think we have a responsibility to ourselves, to our children and grandchildren, the folks that are going to come after us, to try and do our business in a more environmentally sustainable way. Okay? I think that's kind of how I see it.

There's certainly a security element to it, if we get more energy independent. And then there's this responsibility element to it that I also take very seriously.

There's a pretty good book called Cradle to Cradle. It talks about this environmental responsibility in some very refreshing ways. The tone of the book, it's written by an architect who taught at the University of Virginia, and a chemist who used to be in Green Peace. And the one thing that's refreshing about it is that it doesn't sort of lambast industry. It just sort of says look, we're a lot smarter than we used to be and so let's take a fresh approach to some of these things that have been sort of classical polluters, if you will. Let's take a fresh approach to the idea of recycling or upcycling by smart material choices, and those sorts of things. Oh by the way, if we do

that, we can also do it in a way that enhances our effectiveness, right? So if we can do our business, which has maybe traditionally been done with some toxic chemicals and generates HAZMAT. That HAZMAT requires storage and inventory and care, et cetera. If we can get out of that HAZMAT business altogether and still do the job effectively, we save because we don't have all of that overhead that comes with managing that HAZMAT.

I recommend that book, and there's a sequel. The two books have kind of changed the way I think about it going forward. This is the past. They are what they are. But going forward, let's just be a lot more creative and open-minded about that part of the business.

Now I thought where you were going to go when you talk about vulnerabilities, is our logistics I think is very vulnerable, right? The fuel, munitions, parts, everything. They're vulnerable across [inaudible]. You talked about infrastructure over here. Our parts are so leaned out right now as well. We need to, I think, build a little bit more warfighting margin in there. Right? We're not Home Depot. Our supply chain can't be like Home Depot. I talk to Admiral Yuen about this quite a bit and the rest of the sort of logistics team. We talk about, our logistics information is out there on unclassified computers. As we talk about the cyber vulnerability, we've got to cover down on that. So there's other vulnerabilities I think in our logistics train that I'm more concerned with.

Question: [Inaudible] tried to get your message delivered to them on the action plan.

Admiral Richardson: What type of new employees are you talking about? New Navy civilians?

Question: Navy civilians.

Admiral Richardson: Great. One thing, I just signed out the Navy Leader Development Framework. I hope you've all had a chance to know that it is out there. Anybody aware of that? Okay. [Laughter]. You are now.

It's on-line, it's electronically available, so I encourage you all to read it, and I encourage your new employees to read it as well. Because one of the signals that became pretty clear to me as I started this business about a year ago was that we could do better in terms of on-boarding, recruiting, educating, training,

developing our Navy civilians. So if we talk about another line of effort, a [bold] line of effort which talks about our Navy team. Right? So active duty, reserve sailors, Navy civilians, and then it's our families. And that's kind of how we draw a circle around our team. So all these brand new team members that you brought on board and that's what you do, this framework talks about how their career can progress if they sort of stick with us. Lots of educational opportunities, development opportunities, leadership opportunities, et cetera. So I hope that that framework provides some structure.

Then in the lab, the warfighting center context, the specifics of developing your brand new hires is going to be different than if I'm at a Navy shipyard. Right? Or if I'm in some other part of our Navy. Security or something. So we're going to be counting on your commanders here to develop the specifics and put together an actual strategy, then come back and tell me how you're getting after the elements of this framework.

So that's all I think a very positive step forward. We committed to ourselves to improve the way we manage and develop our Navy civilians. This framework is an important step in that regard and the strategies coming back.

This is again where I kind of need you. You've got to help me help myself here. Keep me honest. If you don't start to feel -- I mean already you've given me the one feedback point. Nobody knew about it. So I got that. So not only do we need to know about it, but we need to be kind of leaning in and making it real, more than just a document.

How does that sound? Thanks a lot for bringing them on board.

Question: [Inaudible].

Admiral Richardson: CBR meaning?

Question: Chem Bio and [inaudible]. I was wondering if you might be able to share some of your experiences in your interactions with industry, [inaudible] might be able to emulate [inaudible].

Admiral Richardson: We have [inaudible] this design. So the line of effort that talks about partnerships, including the partnership of industry, is our purple line of effort. So we've been doing a lot of work with industry. Much of it in the context of doing what we need to do faster. And so if there's

something that would definitely be an overriding theme for our time together here, one of my messages to you is, I would say for the first time in 25 years maybe, we are back in a contest, a legitimate contest for maritime superiority, particularly in some very important regions of the world. When you read about South China Sea, you read about the rebalance to the Pacific, you read about the Kuznetsov deployment to the Mediterranean. We know what these areas are. Do you know about 33 percent of the world's trade flows through the South China Sea? A very important part of the world. If you think about through the Mediterranean, coming in through Gibraltar and out through Suez and on down, that's around 22 to 25 percent of the world's trade flows through that body of water. So very important parts of the world. We want to maintain our strategic influence there and that since the fall of the Wall, since the end of the Cold War, is being contested for the first time in 25 years.

So we've got to kind of get our competitive muscles back. Right? We've sort of enjoyed a relatively uncontested period of time. You all know that the difference when you're out jogging and you're not racing. So we've got to kind of get our racing muscles back here. And time is of the essence. You had the luxury of taking more time when it's less competitive, but in industry, it's always competitive, right? And they wonder why we take so much time to do things.

We also, I think, fool ourselves when we think that we can administrate or review risk out of a program by just having layers of approvals or something else. I think you know better than anybody, risk reduction, particularly technical risk reduction comes with getting the technology out there and running it through its paces. So you've got a prototype, you've got to operate it and take it to its [barrier] points and then adjust and extend it, right?

So as we work with industry, the acquisition process, the acquisition part of our business is another area where we need to be much more conscious of time as part of our competitive space. Right? Competing in time. And we take too long to do things. We take too long to do just about everything. We haven't really gotten back into this highly competitive state of mind.

Industry is ready to help us there. They can right off the top of their head tell us ten areas where we're just slowing ourselves down. We need to get out of our own way as a customer.

Conversely, I'm also challenging them. Why does it take eight years to do this? The private sector does something that's pretty similar in three years. So tell me where I need to get faster. I'll challenge assumptions and ask you to get faster. But we need to get faster.

There has been an awful lot of attention paid on Silicon Valley. I've been out there. They have a tremendous amount to contribute, I think, particularly in the area of information technologies, and these things that are moving very very fast.

But I'm also talking to folks, you know, the bigger companies, more established companies, General Electric and some others, that have an awful lot in common with the Navy as well. Right? Worldwide company, a lot of capital investment, heavy machinery, lots of people, and they have to kind of modernize and digitize and become innovative in stride. You've got to adapt all that, right?

So it's talking with a broad spectrum of industry, that we're taking parts of the solution from different areas to do that. Right? So I think it's a vibrant conversation and this idea of doing things faster, enabled by a lot of information technology, is a theme that I'm continuing to engage with them.

Question: I was wondering, I read an article last year. It was the CNO [inaudible].

Admiral Richardson: Which CNO was that? [Laughter].

Question: [Inaudible].

Admiral Richardson: That's a classic, quote me -- [Laughter].

Question: [Inaudible].

Admiral Richardson: We're kind of, as you all know better than I do, we are where we are with respect to cyber in many ways right now. And it's kind of like the environmental question. We're a lot smarter now about things so part of what I think I was saying when I mentioned that was as we design the next class of warship, we need to make it information warfare in its DNA. We need to engrain information warfare in its DNA. Okay? Not put it out on top. And we need to do so in a very integrated fashion.

So I see cyber as sort of one part of the information warfare spectrum, which is becoming more and more apparent, right? As you think about some of these things coming through different apertures and ending up on a network. Boy, it really does start to feel like one whole thing, doesn't it?

So what do we need to do? Since we're so much smarter right now, and by getting in at the design level for the next class of major surface combatants, large surface combatants, small surface combatants, aircraft, you know, can I be smarter about putting information warfare in the DNA of the ship, right?

It goes back to materials, right? Is there a material where you can make the skin of the ship part of the sensors? Submarines have been doing this acoustically for a while, right? The actual ship itself is kind of a giant sensor, or coated with a sensor or something. So there's that.

Then there is sort of this information infrastructure that can be built to be a lot more secure. The advancement in cyber in terms of using an artificial intelligence agent to monitor the traffic on the network. We've got to think a little more holistically about designing that in from the ground up, right?

In very general terms, and I think I might have mentioned this during that talk. Some parts of that ship are going to last the whole life of the ship. The hull. And I have confidence that the hull is still going to be needed over the life of the ship. All those principles of buoyancy and everything will probably continue to apply. That I've got confidence in.

The propulsion plant, the question I was asked earlier, right? In terms of integrating future systems we need to build a propulsion plant with as much margin as we can tolerate I think. It's like memory in your computer. Buy as much as you can afford because what's coming down the road is only going to demand more.

Same with power, I think. Buy as much as you can afford and put it in the ship because that's very hard to change after you're doing. And not only the capacity of the power, but the type of power. [Inaudible] power and all that sort of thing.

Cooling and those sorts of things also. So leave a lot of margin when it comes to space, weight, cooling, power because they're going to last the life of the ship.

If you want to think about quieting and stealth, it's very hard to change that after you design it in, right? So you have to be thoughtful about those things that are going to last the life of the ship.

The rest of it should be just like, what is it an RS2-32 connection, whatever it is. A giant plug to plug in for power, plug in for the network, plug in for cooling and it's going to change very fast over that 30-year life of the ship. So this modular type of an approach that allows us from the design up to really kind of ride the technology curve. Whether it continues to be Moore's Law or not, what have you. We want to build that in from the start. Right?

So there's going to be parts of the ship that last 30 years, we must be very thoughtful about that. Build in a lot of margin. Then there's going to be a major part of the ship, combat systems, sensors, weapons, payloads, you name it, that are going to change very fast and we've got to design that in as well.

Question: [Inaudible] South China Sea, [inaudible]. So [inaudible] use of unmanned vehicles changing [inaudible], competitors or [inaudible]. So from a programmatic standpoint, [inaudible] all about buying unmanned systems and I was wondering about the impact [inaudible] modifying [inaudible].

Admiral Richardson: We're still heavily invested in unmanned. Does it change the risk calculus and all those sorts of things? I don't think that was an unexpected possibility. As I think about unmanned, whether it's an unmanned thing that is propelled, maybe can move fast in the air, on the surface, under the surface. Whether it's something that kind of glides. This is a glider, [inaudible], it's moving but not very fast. Whether it's something that's fixed. Right? Maybe it's anchored, tethered. I think that it's always been one of those vulnerabilities that someone's going to find it and grab it. So we sort of built that in.

As we get more active in the use of unmanned systems, I think our understanding of that will mature and we might adjust. I don't think it's a reason to retreat from continuing to use unmanned.

Question: I wanted to ask you actually to expand on that question. What's your perspective on or what are you thinking about for the future of how unmanned systems will play into the

structure of the surface fleet and how the surface fleet chooses to fight in the future.

Admiral Richardson: Admiral Rowden is really thinking hard about that.

I will tell you, my near term, most likely possibility there, where I would love to see unmanned surface engaged is in mine countermeasure. So if you think about the way we search and find mines, mine-like objects, however you want to describe it. We have a towed thing underwater that does a lot of that work. It's a towed sensor. And you go through a minefield, for crying out loud, so [inaudible] works. If I can do that with an unmanned vehicle, I send something off and it's got enough autonomy to do a search pattern, enough connectivity that I can see things and all of that technology to allow me to recreate a map that sensor would build for me. That is a terrific near-term opportunity for unmanned, I think. Right? Unmanned surface.

Maybe we might get to the point where I won't need to tow that underwater vehicle, I can let it do its business on its own. There's some power density challenges for real big searches right now. And we're overcoming those. You can see technology advancing in those areas. So maybe I won't need the unmanned surface for that in the future sometime.

Then you can start to think about all these sorts of different flavors of reconnaissance attack networks, right? If I can send an unmanned type of a capability into a high threat area, why wouldn't I? Right? Building these sorts of unmanned, and then to what degree is it autonomous? It's a big part of our future. A big asymmetric part of our future. I think we need to start modeling and thinking through the implications of how far can we go with autonomy? What is the permanent place for people in that system, particularly when it comes to decisions like weapons release and those sorts of things, right? I think a lot of near term possibility, potential, for unmanned surface, we'll build on that and look to expand on that out.

Thank you very much. A super, energetic morning. I don't even need a cup of coffee now because you got everything firing in my head. Thanks very much for your time and have a great day.

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